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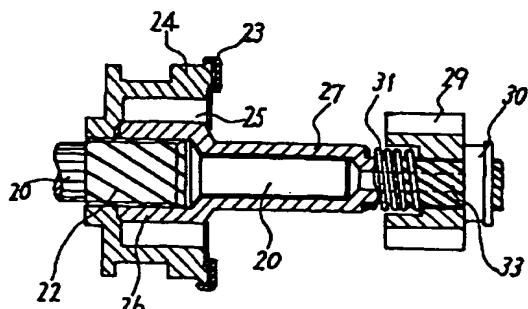
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## (54)【発明の名称】 内燃機関始動装置

## (57)【要約】

【課題】 ピニオンの角部がリングギヤの角部や底にくい込んだ状態でも噛み合い、および、復帰が可能な内燃機関始動装置を得る。

【解決手段】 電動機に駆動され、外周にヘリカルスプローライン22を有する出力軸20と、駆動部材24と従動部材26とを有し、駆動部材24が出力軸20のヘリカルスプローライン22と係合する一方方向クラッチ23と、この一方方向クラッチ23の従動部材26に一方の端部が結合され、他方の端部にヘリカルスプローライン33を有するピニオン軸27と、このピニオン軸27のヘリカルスプローライン33と係合し、ピニオン軸27の移動により内燃機関のリングギヤと噛み合うピニオン29とを備え、出力軸20のヘリカルスプローライン22とピニオン軸27のヘリカルスプローライン33とが電動機の駆動による回転方向とは反回転方向で同一傾きの捻れ角度を有するように設定したものである。



- 20: 出力軸
- 22,33: ヘリカルスプローライン
- 23: 一方方向クラッチ
- 24: 駆動部材
- 25: ローラ
- 26: 従動部材
- 27: ピニオン軸
- 29: ピニオン
- 30: ストップ
- 31: バネ

## 【特許請求の範囲】

【請求項1】 電動機に駆動されると共に、外周にヘリカルスブラインを有する出力軸、駆動部材と従動部材とを有し、駆動部材が前記出力軸のヘリカルスブラインと係合する一方向クラッチ、この一方向クラッチの前記従動部材に一方の端部が結合され、他方の端部にヘリカルスブラインを有するピニオン軸、このピニオン軸のヘリカルスブラインと係合し、前記ピニオン軸の移動により内燃機関のリングギヤと噛み合うピニオンを備え、前記出力軸のヘリカルスブラインと前記ピニオン軸のヘリカルスブラインとが前記電動機の駆動による回転方向とは反回転方向に同一傾きの捻れ角度を有して設定されたことを特徴とする内燃機開始動装置。

【請求項2】 ピニオン軸の先端部に取り付けられたピニオン脱落防止用のストッパと、ピニオン軸に嵌挿されてピニオンをストッパ側に押圧するバネとを有し、ストッパとピニオンとの間にこのバネの押圧力に抗して所定の空隙を保持するための弾性部材を介在させたことを特徴とする請求項1に記載の内燃機開始動装置。

【請求項3】 ピニオン軸の先端部に溝とリード角とが交互に設けられ、ストッパの内径がこの溝とリード角とに合致する形状とされてピニオン軸に係合されると共に、ピニオン軸のリードにはストッパの脱落防止用の突起が一条置きに設けられたことを特徴とする請求項1または請求項2に記載の内燃機開始動装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 この発明は、リングギヤに対する噛み合いと離脱とが確実になし得るピニオン移送機構を備えた内燃機開始動装置に関するものである。

## 【0002】

【従来の技術】 内燃機関の始動は、始動用の電動機に装着されたピニオンを内燃機関のリングギヤと噛み合わせることによりなされるが、始動を円滑に行うためにはこのピニオンとリングギヤとの噛み合い、および、離脱を確実なものとする必要があり、例えば、特開昭64-56966号公報に開示された技術は、ピニオンとリングギヤとの噛み合いを確実なものにするための技術の一例である。図5はこの公報に開示された技術を第一の従来例として示したもので、図において、1は始動用電動機の軸、2はこの軸1に設けられたギヤ、3は一方向クラッチのクラッチアウタ、4はクラッチアウタ3の外周に設けられ、軸1に設けられたギヤ2と噛み合うクラッチギヤ、5は一方向クラッチのローラ、6はクラッチインナ、7と8とはこのクラッチインナ6をハウジング9に保持するペアリングである。

【0003】 10はクラッチインナ6とはヘリカルスブライン11により係合保持されたピニオン軸、12はピニオン軸10とヘリカルスブライン13により係合するピニオンであり、ヘリカルスブライン11とヘリカルス

ブライン13とは電動機の回転方向に対して反回転方向に捻れて形成され、その捻れ角はヘリカルスブライン13の方が大きくなっている。14はピニオン軸10上でピニオン12の位置を規制するストッパ、15はピニオン12をストッパ14側に押圧するバネ、16はバネ15を受けるワッシャ、17はピニオン12とピニオン軸10とを戻すピニオン戻しバネ、18はピニオン12とピニオン軸10とを移送するシフトレバー、19は内燃機関のリングギヤである。

【0004】 このように構成された第一の従来例の内燃機開始動装置において、始動の操作がなされるとシフトレバー18がピニオン戻しバネ17に抗してピニオン軸10をリングギヤ19側に移送し、電動機が所定値に制限されたトルクで駆動されてクラッチアウタ3とローラ5とクラッチインナ6とを介してピニオン軸10とピニオン12が駆動される。ピニオン12はピニオン軸10と共に移送されてリングギヤ19と噛み合い内燃機関を始動するが、ピニオン軸10とピニオン12とは移送時にヘリカルスブライン11のリード角に従って回転しながら移送され、もしピニオン12とリングギヤ19との歯面が衝突して噛み合わないときにはピニオン軸10の移送によってバネ15が撓み、ピニオン12がヘリカルスブライン11とヘリカルスブライン13とのリード角の差により回転してリングギヤ19との噛み合いを完了し、噛み合い完了と共に電動機が通電されて内燃機関を始動する。

【0005】 また、図6は他の構成を持つ第二の従来例を示すもので、この従来例においては電動機の軸1に設けられたギヤ2は出力軸20に取り付けられたギヤ21と噛み合うように構成されている。22は出力軸20に設けられたヘリカルスブライン、23は一方向クラッチであり、一方向クラッチ23のクラッチアウタとなる駆動部材24はヘリカルスブライン22と係合し、出力軸20から伝達されるトルクは駆動部材24からローラ25を介してクラッチインナとなる従動部材26に伝達され、従動部材26と一体化されたピニオン軸27を駆動する。

【0006】 ピニオン軸27の先端部に設けられたスラストスブライン28にはピニオン29が係合しており、図示しないシフトレバーにより一方向クラッチ23が移送されることにより、ピニオン29がヘリカルスブライン22のリード角に従って回転しながら移送され、図示しないリングギヤと噛み合うように構成されている。なお、30はピニオン29の抜け止め用のストッパ、31はピニオン29をストッパ30側に押圧するバネ、32はストッパ30をピニオン軸27に固定するリングであり、ヘリカルスブライン22は電動機の回転方向とは反回転方向に捻れて形成されている。

【0007】 このように構成された第二の従来例の内燃機開始動装置では、始動操作がなされると図示しないシ

フレバーが一方向クラッチ23を図の右方に移送するよう構成されており、一方向クラッチ23はヘリカルスライス22のリード角に従って回転しながらビニオン29と共に移送され、ビニオン29が図示しないリングギヤと噛み合って内燃機関を始動する。もしビニオン29とリングギヤとの歯面が衝突して噛み合わないときにはビニオン軸27の移送によってバネ31が撃み、ヘリカルスライス22のリード角によりビニオン29が回転してリングギヤとの噛み合いを完了し、噛み合い完了と共に電動機が通電されて内燃機関を始動する。

## 【0008】

【発明が解決しようとする課題】以上のような従来構成の内燃機開始装置において、例えば第一の従来例で、ビニオン12が移送されてビニオン12の歯の先端角部がリングギヤ19の歯の角部、または、使用中に形成された疵の部分に当接し、さらにシフトレバー18により押圧された場合、ビニオン12の角部がリングギヤ19の角部や疵にくい込む状態となってビニオン12はヘリカルスライス11や13のリード角に伴う回転ができなくなることがあります。特に、第一の従来例のようにヘリカルスライス13のリード角が大きい場合にはスラスト方向の力に対する回転方向の分力が小さいために回転が不能になって噛み合いができないことがあります。

【0009】このような状態で再度始動操作を行うために電動機の通電をオフにすると、シフトレバー18が戻り、ビニオン戻しバネ17の押圧によりビニオン12とビニオン軸10とが元の位置に復帰しようとするが、この復帰は、ヘリカルスライス11のリード角に従ったビニオン12の回転を伴うものであり、この回転は電動機による駆動とは同一方向の回転であるから、上記のようにビニオン12の角部がリングギヤ19の歯の角部や疵にくい込んだ状態ではこの回転もできないことになり、結果的には始動動作も復帰もできないロック状態となってしまう。また、上記の第二の従来例においてもビニオン29はスラストスライス28によりビニオン軸27と係合しているが、ビニオン29の先端の角部がリングギヤの歯の角部や疵にくい込んだ状態では同様のことが発生し、復帰時におけるヘリカルスライス22のリード角に伴う回転ができないために、動作と復帰と共に不可能になる。

【0010】また、上記のように第一の従来例ではビニオン軸10に対するビニオン12の抜け止めにはストッパ14が設けられ、第二の従来例ではビニオン軸27の先端部にストッパ30とリング32とが設けられているが、使用状態においてはビニオンからストッパ14、または、ストッパ30とリング32に衝撃力が加わり、ストッパやリングが摩耗したり、極端な場合には脱落することがあり、特に、第一の従来例ではヘリカルスライス13が反回転方向に大きく捻れているためにビニオン12からストッパ14に加わる力は大きくなる。

【0011】この発明は、このような課題を解決するためになされたもので、ビニオンがリングギヤの歯の角部や疵にくい込んで最終的には噛み合いができるようにし、もし、噛み合いが不能になっても復帰が不可能になることがなく再度の始動操作が可能であり、ストッパなどの摩耗の少ない内燃機開始装置を得ることを目的とするものである。

## 【0012】

【課題を解決するための手段】この発明に係わる内燃機開始装置は、電動機に駆動されると共に、外周にヘリカルスライスを有する出力軸と、駆動部材と従動部材とを有し、駆動部材が出力軸のヘリカルスライスと係合する一方向クラッチと、この一方向クラッチの従動部材に一方の端部が結合され、他方の端部にヘリカルスライスを有するビニオン軸と、このビニオン軸のヘリカルスライスと係合し、ビニオン軸の移動により内燃機関のリングギヤと噛み合うビニオンとを備え、出力軸のヘリカルスライスとビニオン軸のヘリカルスライスとが電動機の駆動による回転方向とは反回転方向で同一傾きの捻れ角度を有するように設定したものである。

【0013】また、ビニオン軸の先端に取り付けられたビニオン脱落防止用のストッパと、ビニオン軸に嵌挿されてビニオンをこのストッパ側に押圧するバネとを有し、ストッパとビニオンとの間にこのバネの押圧力を抗して所定の空隙を保持するための弾性部材を介在させるようにしたものです。さらに、ビニオン軸の先端部に溝とリードとが交互に設けられ、ストッパの内径がこの溝とリードとに合致する形状とされてビニオン軸に係合されると共に、ビニオン軸のリードにはストッパの脱落防止用の突起が一条置きに設けられるようにしたものである。

## 【0014】

【発明の実施の形態】実施の形態1. 図1は、この発明の実施の形態1による内燃機開始装置の構成を示す断面図であり、電動機の部分は省略してビニオン移送系の部分のみを示しており、上記の第二の従来例と同一部分には同一符号が付与されている。図において、20は図示しない電動機に駆動される出力軸、22はこの出力軸20に設けられたヘリカルスライス、23は一方向クラッチであり、一方向クラッチ23は、ヘリカルスライス22と係合する駆動部材24と、トルクを伝達するローラ25と、ローラ25を介して一方向にのみ駆動される従動部材26とを有しており、従動部材26にはビニオン軸27が一体に構成され、ビニオン軸27の先端部にはヘリカルスライス33が設けられてビニオン29が係合している。

【0015】出力軸20に設けられたヘリカルスライス22とビニオン軸27に設けられたヘリカルスライス33とは共に図示しない電動機から駆動されるビニオン29の回転方向に対しては反回転方向に捻れて形成さ

れ、そのリード角は等しく設定されている。また、30はピニオン軸27の先端部に設けられてピニオン29の位置を規制すると共に抜け止めとなるストッパ、31はピニオン29をストッパ30側に付勢するバネである。

【0016】このように構成されたこの発明の実施の形態1による内燃機関始動装置において、始動操作がなされると図示しない電動機から出力軸20が所定値に制限されたトルクで駆動され、図示しないシフトレバーにより一方向クラッチ23の駆動部材24が従動部材26に固定されたピニオン軸27およびピニオン29と共にヘリカルスライン22のリード角に従って回転しながら図示しないリングギヤ側に移送される。ピニオン29が図示しないリングギヤとほぼ完全に噛み合う位置まで移送されると、図示しない移送レバーと連動して電動機に通電がなされ、内燃機関を駆動して始動させる。

【0017】ピニオン29の移送の途上において、ピニオン29の歯の先端角部が図示しないリングギヤの歯の角部、または、使用中に形成された疵の部分に押圧され、噛み合いが不能になったときにはピニオン29はその位置にて停止するが、ヘリカルスライン22とヘリカルスライン33とはリード角が等しく設定されているので、ピニオン29の回転が停止しても一方向クラッチ23とピニオン軸27との移送は継続が可能であり、この移送が所定位置に達すると電動機に通電がなされて強いトルクが働くのでピニオン29は回転し、一方向クラッチ23とピニオン軸27のみが移送されている間に撓んだバネ31の押圧力によりピニオン29とリングギヤとの噛み合いがなされ、内燃機関の始動が可能になる。

【0018】また、ピニオン29の角部がリングギヤの角部にくい込んだ状態において始動動作がなされなかつたきには始動操作を中断することにより、図示しないシフトレバーが元の位置に復帰し、その後の復帰動作と共に一方向クラッチ23とピニオン軸27も元の位置に復帰するが、復帰の動きとして一方向クラッチ23とピニオン軸27とがヘリカルスライン22のリード角に従って回転するとき、同一リード角を持つヘリカルスライン33はピニオン29が回転不能の状態であっても回転することができるので、結果としてピニオン29は回転することなく軸方向に移動してリングギヤとのくい込みから離脱することができる、元の位置に復帰して再始動の操作が可能となり、ロック状態になることはない。

【0019】実施の形態2、図2は、この発明の実施の形態2による内燃機関始動装置の構成を示す断面図であり、この実施の形態における内燃機関始動装置は、実施の形態1の内燃機関始動装置に対し、ピニオン29とストッパ30との間に弾性部材34としてのバネを挿入し、バネ31と弾性部材34との力量関係をピニオン29とストッパ30との間に通常状態において若干の空隙が形成されるようにしたものである。

【0020】このように構成することにより、ピニオン29とヘリカルスライン33との相互回転によりピニオン29とストッパ30とが衝突しても弾性部材34により荷重が分担されるために衝撃力は小さくなり、ストッパ30の摩耗を大幅に低減することができ、またピニオン軸27からの脱落を防止することができる。なお図3に示すように、ピニオン29に凹部を設けず、弾性部材34の全圧縮状態においてピニオン29とストッパ30との間に空隙を形成しておくこともでき、このように構成しても同様の効果を得ることができる。

【0021】実施の形態3、図4は、この発明の実施の形態3による内燃機関始動装置の構成を示す断面図であり、この実施の形態における内燃機関始動装置は、実施の形態1および2の内燃機関始動装置に対しストッパ30の取り付け形状を変えたもので、ピニオン軸27の先端部には溝27aとリード27bとを交互に設け、リード27bの先端には一条飛びに突起部27cを設けると共に、ストッパ30の取付穴30aには突起部27cの形状に合わせた大径部30bを設け、ストッパ30をピニオン軸27に挿入の上、リード27bの一ピッチ分回動させることにより抜け止めとしたものである。このように構成することにより上記の従来例に対してリングが廃止できると共に装着性が良好となり、ピニオンとの接触面積を増大させて耐摩耗性を向上させることができるものである。

【0022】

【発明の効果】以上に説明したようにこの発明の内燃機関始動装置によれば、外周にヘリカルスラインを有する出力軸と、このヘリカルスラインと係合する一方向クラッチと、一方向クラッチの従動部材と一緒に構成され端部にヘリカルスラインを有してこのヘリカルスラインに係合するピニオン有するピニオン軸とを備え、出力軸のヘリカルスラインとピニオン軸のヘリカルスラインとを電動機の駆動回転方向とは反回転方向で同一傾きの捻れ角度に設定したので、ピニオンがリングギヤとくい込んでロック状態となっても電動機に通電してロック状態をはずすか、もしくは、通電を止めて復帰させることができ、ロック状態が継続して操作不能に陥ることはなく、また、ピニオンとストッパとの間に弾性部材を介在させたのでストッパの摩耗を大幅に低減することができ、さらに、ピニオン軸の先端に溝とリードとを交互に形成し、ストッパをこれに係合してリードにストッパ脱落防止用の突起を一条置きに設けたので、ストッパの装着が容易となり、接触面積が増大して耐摩耗性が向上するなど、優れた内燃機関始動装置を得ることができるものである。

【図面の簡単な説明】

【図1】この発明の実施の形態1の内燃機関始動装置の断面図である。

【図2】この発明の実施の形態2の内燃機関始動装置

の断面図である。

【図3】 この発明の実施の形態2の内燃機関始動装置  
の他の構成の断面図である。

【図4】 この発明の実施の形態3の内燃機関始動装置  
の断面図である。

【図5】 従来の内燃機関始動装置の断面図である。

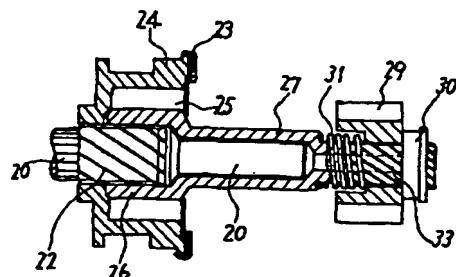
【図6】 従来の内燃機関始動装置の他の構成の断面図

である。

【符号の説明】

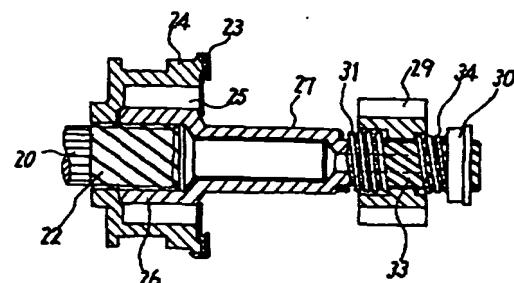
20 出力軸、22、33 ヘリカルスライド、23  
一方向クラッチ、24 駆動部材、25 ローラ、2  
6 従動部材、27 ピニオン軸、29 ピニオン、3  
0 ストップ、31 パネ、34 弾性部材。

【図1】

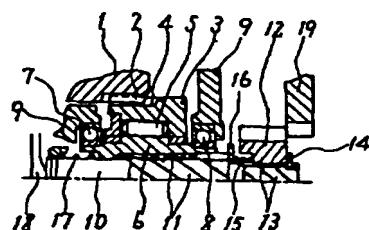


20:出力軸  
22,33:ヘリカルスライド  
23:一方向クラッチ  
24:駆動部材  
25:ローラ  
26:従動部材  
27:ピニオン軸  
29:ピニオン  
30:ストップ  
31:パネ

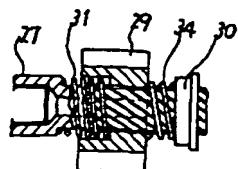
【図2】



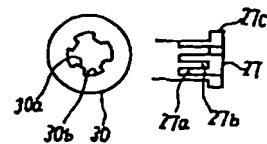
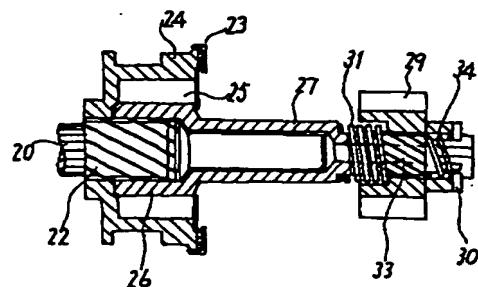
【図5】



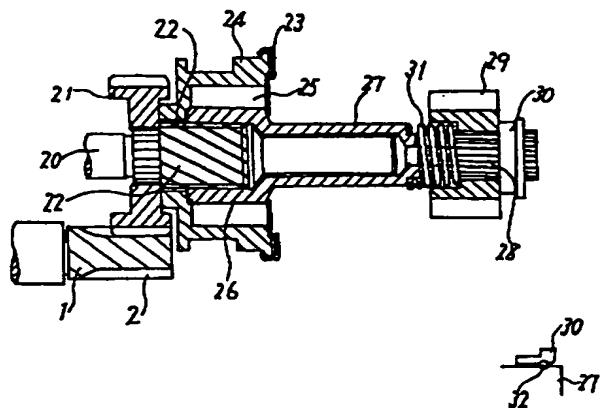
【図3】



【図4】



【図6】



フロントページの続き

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CLAIMS

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[Claim(s)]

[Claim 1] The output shaft which has a helical spline on a periphery while driving to a motor, The one way clutch to which it has driving member and a follower member, and driving member engages with the helical spline of the aforementioned output shaft, The pinion shaft which one edge is combined with the aforementioned follower member of this one way clutch, and has a helical spline in the other-end section, Engage with the helical spline of this pinion shaft, and it has the pinion which gears with the starter ring of an internal combustion engine by movement of the aforementioned pinion shaft. For the hand of cut by the drive of the aforementioned motor, the helical spline of the aforementioned output shaft and the helical spline of the aforementioned pinion shaft are the internal combustion engine starting system with which it is characterized by having the degree of torsion angle of the same inclination in an anti-hand of cut, and being set as it.

[Claim 2] Internal combustion engine starting system according to claim 1 characterized by making the elastic member for having the stopper for pinion defluxion prevention attached in the point of a pinion shaft, and the spring which is fitted in a pinion shaft and presses a pinion to a stopper side, resisting the press force of this spring between a stopper and a pinion, and holding a predetermined opening intervene.

[Claim 3] Internal combustion engine starting system according to claim 1 or 2 characterized by preparing the salient for defluxion prevention of a stopper in the lead of a pinion shaft every line while a slot and a lead are formed in the point of a pinion shaft by turns, considering as the configuration with which the bore of a stopper agrees in this slot and lead and engaging with a pinion shaft.

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**DETAILED DESCRIPTION****[Detailed Description of the Invention]**

[0001]

[The technical field to which invention belongs] This invention relates to the internal combustion engine starting system equipped with the pinion transport station which the engagement to a starter ring and secession can make certainly.

[0002]

[Description of the Prior Art] The technology which needed to make the positive thing engagement with this pinion and starter ring and secession in order to start smoothly, for example, was indicated by JP,64-56966,A although starting of an internal combustion engine was made by engaging with the starter ring of an internal combustion engine the pinion with which the motor for starting was equipped is an example of the technology for making engagement with a pinion and a starter ring into a positive thing. Drawing 5 is what showed the technology indicated by this official report as first conventional example. The gear by which 1 was prepared in the shaft of the motor for starting, and 2 was prepared in this shaft 1 in drawing, The clutch gear which gears with the gear 2 which 3 was prepared in the clutch outer of an one way clutch, and 4 was prepared in the periphery of the clutch outer 3, and was prepared in the shaft 1, and 5 are bearings to which the roller of an one way clutch and 6 hold this clutch inner 6 to a clutch inner, and 7 and 8 hold it in housing 9.

[0003] The pinion shaft with which engagement maintenance of 10 was carried out by the helical spline 11 in the clutch inner 6, and 12 are pinions engaged by the pinion shaft 10 and the helical spline 13, the helical spline 11 and the helical spline 13 are twisted and formed in an anti-hand of cut to the hand of cut of a motor, and, as for the torsion angle, the direction of the helical spline 13 is enlarged. The stopper with which 14 regulates the position of a pinion 12 on the pinion shaft 10, the spring with which 15 presses a pinion 12 to a stopper 14 side, the washer with which 16 receives a spring 15, the pinion return spring with which 17 returns a pinion 12 and the pinion shaft 10, the shift lever to which 18 transports a pinion 12 and the pinion shaft 10, and 19 are the starter rings of an internal combustion engine.

[0004] Thus, in the internal combustion engine starting system of the first constituted conventional example, if operation of starting is made, a shift lever 18 will resist the pinion return spring 17, and the pinion shaft 10 will be transported to a starter-ring 19 side, and it drives with the torque with which the motor was restricted to the predetermined value, and the pinion shaft 10 and a pinion 12 drive through the clutch outer 3, a roller 5, and the clutch inner 6. Although a pinion 12 is transported with the pinion shaft 10, and gears with a starter ring 19 and an internal combustion engine is put into operation The pinion shaft 10 and a pinion 12 are transported rotating according to the lead angle of the helical spline 11 at the time of a transfer. When the tooth flank of a pinion 12 and a starter ring 19 collides and does not gear, a spring 15 bends by transfer of the pinion shaft 10. A pinion 12 rotates according to the difference of the lead angle of the helical spline 11 and the helical spline 13, and completes engagement with a starter ring 19, with engagement completion, a motor is energized and an internal combustion engine is put into operation.

[0005] Moreover, drawing 6 shows the second conventional example with other composition, and the

gear 2 prepared in the shaft 1 of a motor in this conventional example is constituted so that it may gear with the gear 21 attached in the output shaft 20. The helical spline by which 22 was prepared in the output shaft 20, and 23 are one way clutches, and the driving member 24 used as the clutch outer of an one way clutch 23 engages with the helical spline 22, and the torque transmitted from an output shaft 20 is transmitted to the follower material 26 which serves as a clutch inner from driving member 24 through a roller 25, and drives the pinion shaft 27 united with the follower material 26.

[0006] By transporting an one way clutch 23 by the shift lever which is not illustrated, the pinion 29 is engaging with the thrust spline 28 prepared in the point of the pinion shaft 27, and it is transported, and while a pinion 29 rotates according to the lead angle of the helical spline 22, it is constituted so that it may gear with the starter ring which is not illustrated. In addition, that a pinion 29 should stop escaping from 30, the stopper of business, the spring with which 31 presses a pinion 29 to a stopper 30 side, and 32 are rings which fix a stopper 30 to the pinion shaft 27, and the helical spline 22 is twisted and formed in the anti-hand of cut with the hand of cut of a motor.

[0007] Thus, it consists of internal combustion engine starting system of the second constituted conventional example so that the shift lever which will not be illustrated if starting operation is made may transport an one way clutch 23 to the method of the right of drawing, and an one way clutch 23 is transported with a pinion 29, rotating according to the lead angle of the helical spline 22, gears with the starter ring which a pinion 29 does not illustrate, and puts an internal combustion engine into operation. When the tooth flank of a pinion 29 and a starter ring collides and does not gear, a spring 31 bends by transfer of the pinion shaft 27, a pinion 29 rotates with the lead angle of the helical spline 22, engagement with a starter ring is completed, with engagement completion, a motor is energized and an internal combustion engine is put into operation.

[0008]

[Problem(s) to be Solved by the Invention] In the internal combustion engine starting system of composition, a pinion 12 is transported in the first conventional example conventionally [ above ]. the point-angle section of the gear tooth of a pinion 12 The corner of the gear tooth of a starter ring 19, Or when the portion of the crack formed while in use was contacted and it is further pressed by the shift lever 18, The corner of a pinion 12 will be in the corner of a starter ring 19, or the state where it is hard a crack, and, as for the rotation accompanying the helical spline 11 or the lead angle of 13, a pinion 12 will become impossible. Especially, since the component of a force of the hand of cut to the force of the thrust direction is small like the first conventional example when the lead angle of the helical spline 13 is large, rotation becomes impossible and engagement becomes impossible.

[0009] If energization of a motor is turned OFF in order to perform starting operation again in such the state, although a shift lever 18 tends to return and a pinion 12 and the pinion shaft 10 tend to return to the original position according to the press force of the pinion return spring 17 This return is a thing accompanied by the rotation of a pinion 12 according to the lead angle of the helical spline 11. Since the drive by the motor is rotation of the same direction, this rotation will be in the lock state which this rotation cannot do the corner of a pinion 12 in the dental corner or the dental state where it was hard the crack of a starter ring 19, either, and can perform neither starting operation nor a return as a result as mentioned above. Moreover, although the pinion 29 is engaging with the pinion shaft 27 by the thrust spline 28 also in the second above-mentioned conventional example, since the same thing occurs and rotation accompanying the lead angle of the helical spline 22 at the time of a return cannot be performed in the dental corner or the dental state where it was hard the crack of a starter ring, both operation and the return of the corner at the nose of cam of a pinion 29 become impossible.

[0010] Moreover, although the pinion 12 to the pinion shaft 10 falls out in the first conventional example as mentioned above, a stopper 14 is formed in a stop and the stopper 30 and the ring 32 are formed in the point of the pinion shaft 27 in the second conventional example In a busy condition From a pinion to a stopper 14 Impulse force joins a stopper 30 and a ring 32. or wear a stopper and a ring out or Since it might drop out and has twisted the helical spline 13 greatly to the anti-hand of cut in the first conventional example especially in being extreme, the force of joining a stopper 14 from a pinion 12 becomes large.

[0011] This invention was made in order to solve such a technical problem, even if engagement becomes impossible, although it is hard a crack, finally it can be made to do engagement, and a bird clapper does not have a return impossible, starting operation for the second time is possible, and a pinion aims it at the corner of the gear tooth of a starter ring, or obtaining internal combustion engine starting system with little wear, such as a stopper.

[0012]

[Means for Solving the Problem] While driving the internal combustion engine starting system concerning this invention to a motor The one way clutch to which it has the output shaft which has a helical spline on a periphery, and driving member and a follower member, and driving member engages with the helical spline of an output shaft, The pinion shaft which one edge is combined with the follower member of this one way clutch, and has a helical spline in the other-end section, Engage with the helical spline of this pinion shaft, and it has the pinion which gears with the starter ring of an internal combustion engine by movement of a pinion shaft. The hand of cut according [ the helical spline of an output shaft and the helical spline of a pinion shaft ] to the drive of a motor is set up so that it may have the degree of torsion angle of the same inclination with an anti-hand of cut.

[0013] Moreover, it has the stopper for pinion defluxion prevention attached at the nose of cam of a pinion shaft, and the spring which is fitted in a pinion shaft and presses a pinion to this stopper side, and is made to make the elastic member for resisting the press force of this spring between a stopper and a pinion, and holding a predetermined opening intervene. Furthermore, a slot and a lead are formed in the point of a pinion shaft by turns, and while it engages with a pinion shaft, the bore of a stopper being used as the configuration corresponding to this slot and lead, the salient for defluxion prevention of a stopper is prepared in the lead of a pinion shaft every line.

[0014]

[Embodiments of the Invention] Gestalt 1. drawing 1 of operation is the cross section showing the composition of the internal combustion engine starting system by the gestalt 1 of implementation of this invention, the portion of a motor is omitted, only the portion of a pinion transfer system is shown, and the same sign is given to the same portion as the second above-mentioned conventional example. The output shaft which drives 20 to the motor which is not illustrated in drawing, the helical spline by which 22 was prepared in this output shaft 20, and 23 are one way clutches. an one way clutch 23 The driving member 24 which engages with the helical spline 22, and the roller 25 which transmits torque, the follower driven only to \*\* on the other hand through a roller 25 -- a member 26 -- having -- \*\*\*\* -- a follower -- the pinion shaft 27 is constituted by the member 26 at one, the helical spline 33 is formed in the point of the pinion shaft 27, and the pinion 29 is being engaged

[0015] Both the helical spline 22 prepared in the output shaft 20 and the helical spline 33 prepared in the pinion shaft 27 are twisted and formed in an anti-hand of cut to the hand of cut of the pinion 29 driven from the motor which is not illustrated, and the lead angle is set up equally. Moreover, the stopper which escapes from it while 30 is prepared in the point of the pinion shaft 27 and regulates the position of a pinion 29, and serves as a stop, and 31 are springs which energize a pinion 29 to a stopper 30 side.

[0016] Thus, it sets to the internal combustion engine starting system by the gestalt 1 of implementation of this constituted invention. It drives with the torque with which the output shaft 20 was restricted to the predetermined value from the motor which will not be illustrated if starting operation is made. It is transported to the starter-ring side which is not illustrated while rotating according to the lead angle of the helical spline 22 with the pinion shaft 27 and pinion 29 by which the driving member 24 of an one way clutch 23 was fixed to the follower material 26 by the shift lever which is not illustrated. When transported to the position which gears with the starter ring which a pinion 29 does not illustrate nearly completely, the transfer lever which is not illustrated is interlocked with and energization is made by the motor, and an internal combustion engine is driven and it is made to start.

[0017] Although a pinion 29 stops in the position when it is pressed by the corner of the gear tooth of the starter ring which the point-angle section of the gear tooth of a pinion 29 does not illustrate, or the portion of the crack formed while in use in the way of a transfer of a pinion 29 and engagement becomes impossible Since the lead angle is set up equally, the helical spline 22 and the helical spline 33 Even if

rotation of a pinion 29 stops, a transfer with an one way clutch 23 and the pinion shaft 27 is continuable. Since energization will be made by the motor and strong torque will work if this transfer arrives at a predetermined position, a pinion 29 is rotated. Engagement with a pinion 29 and a starter ring is made according to the press force of the spring 31 which bent while only the one way clutch 23 and the pinion shaft 27 were transported, and starting of an internal combustion engine is attained.

[0018] \*\*\*\* by which starting operation was not made in the state whose corner of a pinion 29 is a starter ring where it was hard the corner moreover, by interrupting starting operation Although the shift lever which is not illustrated returns to the original position and an one way clutch 23 and the pinion shaft 27 also return to the original position with the return operation When an one way clutch 23 and the pinion shaft 27 rotate according to the lead angle of the helical spline 22 as movement of restoring, Since the helical spline 33 with the same lead angle can be rotated even if a pinion 29 is in the state which cannot be rotated As a result, without rotating, a pinion 29 can be seceded from the that it is lump which moves to shaft orientations and goes away with a starter ring, and it returns to the original position, and the operation of restart of it is attained, and, as for a bird clapper, it will be in a lock state. [0019] Form 2. drawing 2 of operation is the cross section showing the composition of the internal combustion engine starting system by the form 2 of implementation of this invention, and the internal combustion engine starting system in the form of this operation To the internal combustion engine starting system of the form 1 of operation, the spring as an elastic member 34 is inserted between a pinion 29 and a stopper 30, and some opening is formed in a normal state between a pinion 29 and a stopper 30 in the ability relation between a spring 31 and an elastic member 34.

[0020] Thus, by constituting, since a load is shared by the elastic member 34 even if a pinion 29 and a stopper 30 collide by mutual rotation with a pinion 29 and the helical spline 33, impulse force can become small, and can reduce wear of a stopper 30 sharply, and can prevent omission from the pinion shaft 27. In addition, the same effect can be acquired, even if it cannot establish a crevice in a pinion 29, but it can also form an opening between a pinion 29 and a stopper 30 in all the compression states of an elastic member 34 and it constitutes in this way, as shown in drawing 3.

[0021] Form 3. drawing 4 of operation is the cross section showing the composition of the internal combustion engine starting system by the form 3 of implementation of this invention, and the internal combustion engine starting system in the form of this operation It is what changed the installation configuration of a stopper 30 to the internal combustion engine starting system of the forms 1 and 2 of operation. While preparing slot 27a and lead 27b in the point of the pinion shaft 27 by turns and preparing height 27c at the nose of cam of lead 27b at a single-threaded jump Major-diameter section 30b doubled with the configuration of height 27c is prepared in attaching hole 30a of a stopper 30, and it escapes by rotating a stopper 30 by one pitch of lead 27b after inserting in the pinion shaft 27, and considers as a stop. Thus, while being able to abolish a ring to the above-mentioned conventional example by constituting, wearing nature can become good, can increase a touch area with a pinion, and can raise abrasion resistance.

[0022]

[Effect of the Invention] The output shaft which has a helical spline on a periphery according to the internal combustion engine starting system of this invention as explained above, It has the one way clutch which engages with this helical spline, and the pinion shaft which is constituted by the follower member of an one way clutch, and one, has a helical spline at the edge, and engages with this helical spline and which carries out pinion \*\*. Since the drive hand of cut of a motor set the helical spline of an output shaft, and the helical spline of a pinion shaft as the degree of torsion angle of the same inclination with the anti-hand of cut or [ energizing to a motor and removing a lock state, even if a pinion will be in a lock state by the starter ring and pile \*\*\*\* ] -- or Can stop energization, can return it, a lock state continues and it does not fall impossible [ operation ]. Moreover, since the elastic member was made to intervene between a pinion and a stopper, wear of a stopper can be reduced sharply. Furthermore, since the slot and the lead were formed at the nose of cam of a pinion shaft by turns, the stopper was engaged with this and the salient for stopper omission prevention was prepared in the lead every line The outstanding internal combustion engine starting system can be obtained -- wearing of a stopper becomes

easy, a touch area increases, and abrasion resistance improves.

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PRIOR ART

[Description of the Prior Art] The technology which needed to make the positive thing engagement with this pinion and starter ring and secession in order to start smoothly, for example, was indicated by JP,64-56966,A although starting of an internal combustion engine was made by engaging with the starter ring of an internal combustion engine the pinion with which the motor for starting was equipped is an example of the technology for making engagement with a pinion and a starter ring into a positive thing. Drawing 5 is what showed the technology indicated by this official report as first conventional example. The gear by which 1 was prepared in the shaft of the motor for starting, and 2 was prepared in this shaft 1 in drawing, The clutch gear which gears with the gear 2 which 3 was prepared in the clutch outer of an one way clutch, and 4 was prepared in the periphery of the clutch outer 3, and was prepared in the shaft 1, and 5 are bearings to which the roller of an one way clutch and 6 hold this clutch inner 6 to a clutch inner, and 7 and 8 hold it in housing 9.

[0003] The pinion shaft with which engagement maintenance of 10 was carried out by the helical spline 11 in the clutch inner 6, and 12 are pinions engaged by the pinion shaft 10 and the helical spline 13, the helical spline 11 and the helical spline 13 are twisted and formed in an anti-hand of cut to the hand of cut of a motor, and, as for the torsion angle, the direction of the helical spline 13 is enlarged. The stopper with which 14 regulates the position of a pinion 12 on the pinion shaft 10, the spring with which 15 presses a pinion 12 to a stopper 14 side, the washer with which 16 receives a spring 15, the pinion return spring with which 17 returns a pinion 12 and the pinion shaft 10, the shift lever to which 18 transports a pinion 12 and the pinion shaft 10, and 19 are the starter rings of an internal combustion engine.

[0004] Thus, in the internal combustion engine starting system of the first constituted conventional example, if operation of starting is made, a shift lever 18 will resist the pinion return spring 17, and the pinion shaft 10 will be transported to a starter-ring 19 side, and it drives with the torque with which the motor was restricted to the predetermined value, and the pinion shaft 10 and a pinion 12 drive through the clutch outer 3, a roller 5, and the clutch inner 6. Although a pinion 12 is transported with the pinion shaft 10, and gears with a starter ring 19 and an internal combustion engine is put into operation The pinion shaft 10 and a pinion 12 are transported rotating according to the lead angle of the helical spline 11 at the time of a transfer. When the tooth flank of a pinion 12 and a starter ring 19 collides and does not gear, a spring 15 bends by transfer of the pinion shaft 10. A pinion 12 rotates according to the difference of the lead angle of the helical spline 11 and the helical spline 13, and completes engagement with a starter ring 19, with engagement completion, a motor is energized and an internal combustion engine is put into operation.

[0005] Moreover, drawing 6 shows the second conventional example with other composition, and the gear 2 prepared in the shaft 1 of a motor in this conventional example is constituted so that it may gear with the gear 21 attached in the output shaft 20. The helical spline by which 22 was prepared in the output shaft 20, and 23 are one way clutches, and the driving member 24 used as the clutch outer of an one way clutch 23 engages with the helical spline 22, and the torque transmitted from an output shaft 20 is transmitted to the follower material 26 which serves as a clutch inner from driving member 24 through a roller 25, and drives the pinion shaft 27 united with the follower material 26.

[0006] By transporting an one way clutch 23 by the shift lever which is not illustrated, the pinion 29 is engaging with the thrust spline 28 prepared in the point of the pinion shaft 27, and it is transported, and while a pinion 29 rotates according to the lead angle of the helical spline 22, it is constituted so that it may gear with the starter ring which is not illustrated. In addition, that a pinion 29 should stop escaping from 30, the stopper of business, the spring with which 31 presses a pinion 29 to a stopper 30 side, and 32 are rings which fix a stopper 30 to the pinion shaft 27, and the helical spline 22 is twisted and formed in the anti-hand of cut with the hand of cut of a motor.

[0007] Thus, it consists of internal combustion engine starting system of the second constituted conventional example so that the shift lever which will not be illustrated if starting operation is made may transport an one way clutch 23 to the method of the right of drawing, and an one way clutch 23 is transported with a pinion 29, rotating according to the lead angle of the helical spline 22, gears with the starter ring which a pinion 29 does not illustrate, and puts an internal combustion engine into operation. When the tooth flank of a pinion 29 and a starter ring collides and does not gear, a spring 31 bends by transfer of the pinion shaft 27, a pinion 29 rotates with the lead angle of the helical spline 22, engagement with a starter ring is completed, with engagement completion, a motor is energized and an internal combustion engine is put into operation.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the cross section of the internal combustion engine starting system of the gestalt 1 of implementation of this invention.

[Drawing 2] It is the cross section of the internal combustion engine starting system of the gestalt 2 of implementation of this invention.

[Drawing 3] It is the cross section of the composition of others of the internal combustion engine starting system of the gestalt 2 of operation of this invention.

[Drawing 4] It is the cross section of the internal combustion engine starting system of the gestalt 3 of implementation of this invention.

[Drawing 5] It is the cross section of the conventional internal combustion engine starting system.

[Drawing 6] It is the cross section of other composition of the conventional internal combustion engine starting system.

[Description of Notations]

20 22 An output shaft, 33 A helical spline, 23 An one way clutch, 24 Driving member, 25 A roller, 26 A follower member, 27 A pinion shaft, 29 A pinion, 30 A stopper, 31 A spring, 34 Elastic member.

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[Translation done.]

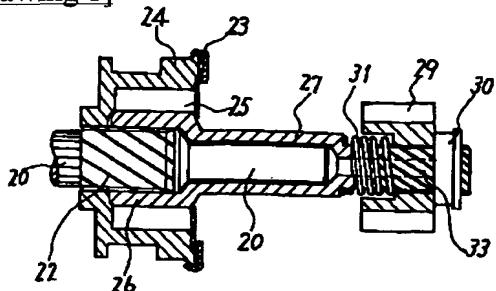
## \* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

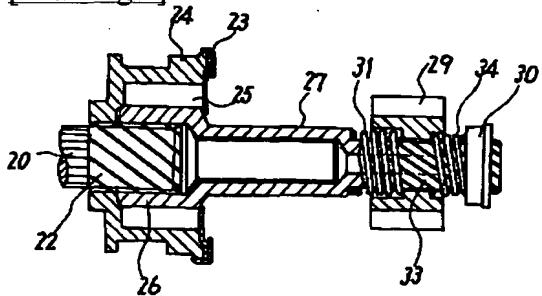
## DRAWINGS

## [Drawing 1]

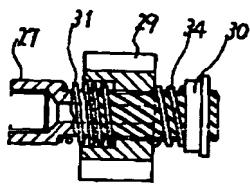


20 : 出力軸  
 22,33 : ヘリカルスライド  
 23 : 一方向クラッチ  
 24 : 駆動部材  
 25 : ローラ  
 26 : 従動部材  
 27 : ピニオン軸  
 29 : ピニオン  
 30 : ストップ  
 31 : パネ

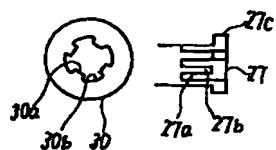
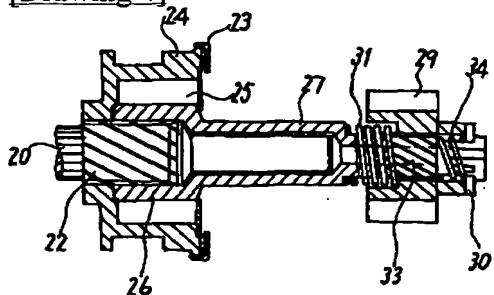
## [Drawing 2]



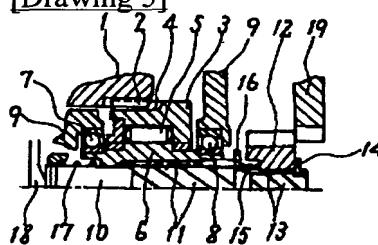
## [Drawing 3]



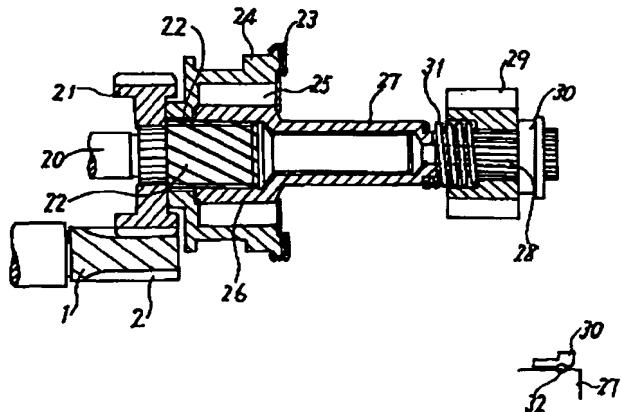
[Drawing 4]



[Drawing 5]



[Drawing 6]



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[Translation done.]